PROPOSAL FOR MODIFICATION OF THE TIMING CONTROL EQUIPMENT AND FOR A TIME-SIGNAL GENERATOR UNIT FOR THE DATA-REDUCTION SYSTEM

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1. Introduction

This exhibit describes a modification of the Timing Control Equipment (rack K) and also describes a proposed Time-Signal Generator Unit. The modification of the Timing Control Equipment will enable it to provide 2,000 one-minute voice counts in uninterrupted sequence. Thus, an 8-hour uninterrupted sequence of one-minute counts will be provided for any part of the 24-hour day. The proposed Time-Signal Generator Unit will provide a time signal for data tapes which do not already contain such information, and would be used in conjunction with the Timing Control Equipment or the Duplicating Equipment - Rack 2 (rack B_2).

2. The Proposed Modification of the K-Rack

a. The proposed modification would change the tape speeds of the voice-readout tape transport and would reduce the time required for each one-minute voice count. The tape speeds would be changed from 3-3/4 and 15 ips (inches per second) to 1-7/8 and 7-1/2 ips. The slower tape speeds will be obtained by using a new motor and a smaller-diameter capstan. The slower tape speed (1-7/8 ips) increases the continuous recording time from 9,600 seconds to 19,200 seconds. The decreased bandwidth, which results from decreasing the tape speed, will still quite adequately meet the requirements of voice reproduction.

b. This increased recording time is sufficient for more than 2,000 voice counts. Each count indicates the time in 1-minute intervals. Thus, a single reel of magnetic tape, 3,600 feet in length, can contain over 33 hours of voice counts. This would provide continuous voice counts for any 9-hour interval.

3. The Proposed Time-Signal Generator Unit

a. The timing tone recorded on the data tapes is normally used as a time base during the duplication of the data tapes. The timing-tone frequency is 1 kc when the tape is played back at normal speed, but it is 4 kc at the four-times-original speed which is usually used in the duplicating operation. If a data tape does not have a timing tone recorded, the Time-Signal Generator output would be used as a substitute. The output would be used by the existing time mark generator and transport sequence control to control transport sequencing. The output of the Time-Signal Generator Unit would also be recorded on the duplicate tape to provide a timing standard for later operations in the data-reduction procedure. The proposed unit would provide both 1-kc and 4-kc outputs so that it can be used with tapes played back at either normal or four-times-normal speed.

b. The Time-Signal Generator Unit will be capable of operating with both the 1/4-inch and 1-inch Data-Reduction Systems.

c. The Time-Signal Generator Unit will consist of a Model TS-3 Chronometer, manufactured by the Times Facsimile Corporation, a frequency quadrupler, and buffer amplifier. The chronometer, shown in figure 1, contains a 1-kc oscillator which is stable to one part in 10^6. The 1-kc timing signal will be obtained by quadrupling the 1-kc signal. The 1-kc and 4-kc signals will be supplied through a low-impedance output stage to a BNC type panel connector. A signal cable will be provided to connect the signal to the Timing Control Equipment (rack K) in the 1-Inch Data-Reduction System or to the Duplicating Equipment - Rack 2 (rack B_2) in the 1/4-Inch Data-Reduction System.

d. The stable 1-kc signal in the Model TS-3 Chronometer operates a synchronous motor which drives a direct-reading clock through a manual clutch and suitable gearing. The front panel of the 1-kc clock is illustrated in figure 1. Since the displayed time is derived from the 1-kc oscillator, the clock is a monitor of the oscillator output and provides a means for checking the accumulated error in the number of cycles generated by the 1-kc oscillator during a given time interval. The manual clutch permits the clock to be adjusted so that the displayed time corresponds to the time broadcast by WWV. The accuracy of the oscillator can be determined by comparing the displayed time at the beginning and end of the operating time interval with the time given by WWV.

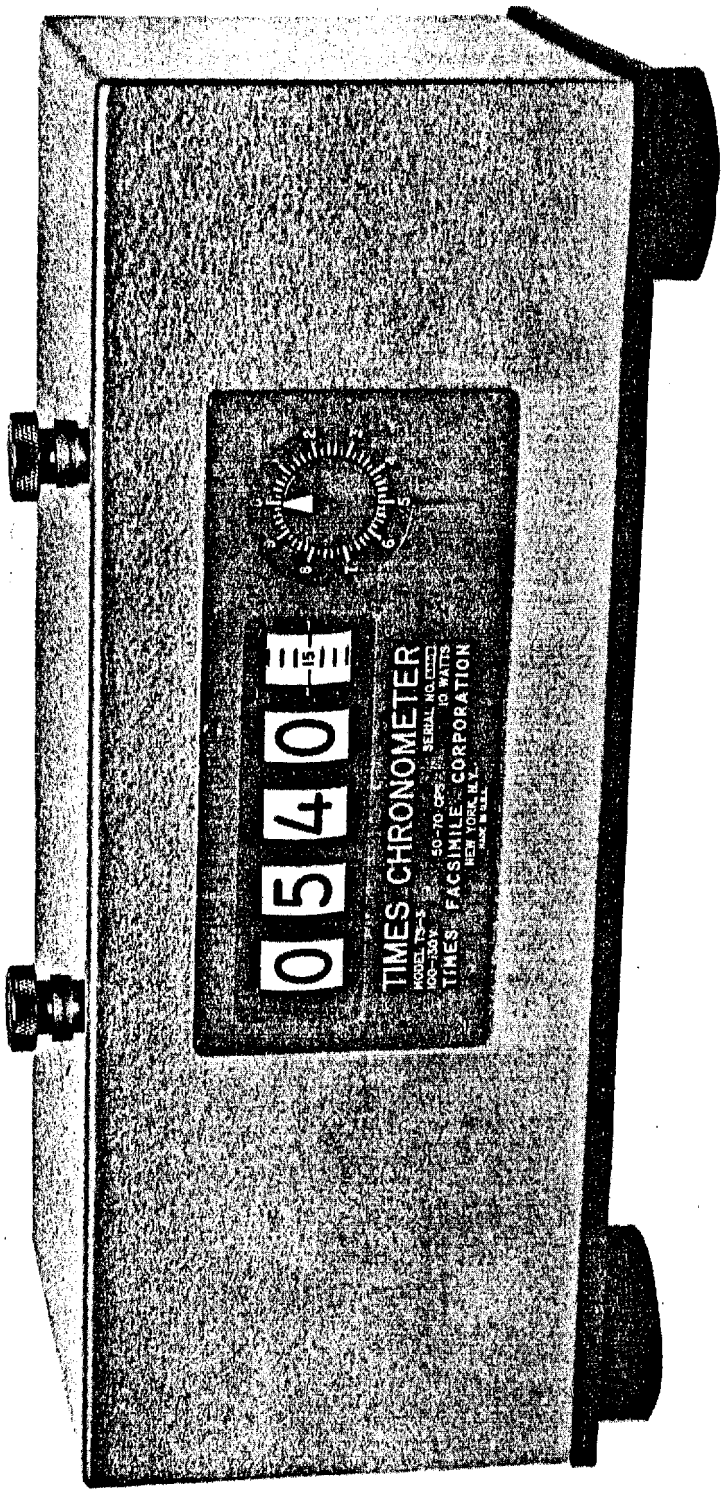

Figure 1. Model TS-3 Chronometer